



# Setifikaat

REPUBLIEK VAN SUID-AFRIKA

PATENTKANTOOR

DEPARTMENT VAN HANDERL  
NYWERHEID

# Certificate

REPUBLIC OF SOUTH AFRICA

PATENT OFFICE

DEPARTMENT OF TRADE  
AND INDUSTRY

Hiermee word gesertifiseer dat  
This is to certify that

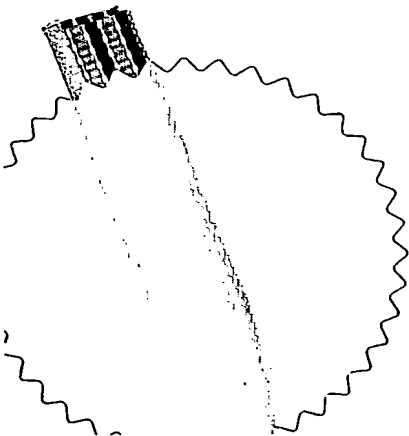
The attached documents are true copies of the Form P2, P6 and a Provisional Specification of a South African Patent application No. 2002/5960 as originally filed on the 25<sup>th</sup> July 2002 and post-dated to the 15<sup>th</sup> August 2002

In the name of : **BALMORAL TECHNOLOGIES (PROPRIETARY)  
LIMITED**

Entitled : **METHOD OF PROCUCING AN INOGANIC BINDER  
CONTAINING PRODUCT.**

Geteken te **PRETORIA** in die Republiek van Suid-Afrika, hierdie **14<sup>th</sup>** dag van **February 2006**  
Signed at in the Republic of South Africa, this day of

Registrateur van Patente  
Registrar of Patents



REPUBLIC OF SOUTH AFRICA		REGISTER OF PATENTS <i>Post-dated</i>		PATENTS ACT, 1978		
OFFICIAL APPLICATION		LODGING DATE: PROVISIONAL		ACCEPTANCE DATE		
21	01	15. 28 JUL 2002		47		
INTERNATIONAL CLASSIFICATION		LODGING DATE: COMPLETE		GRANTED DATE		
51		23				
FULL NAME(S) OF APPLICANT(S)/PATENTEE(S)						
71	BALMORAL TECHNOLOGIES (PROPRIETARY) LIMITED					
APPLICANTS SUBSTITUTED:				DATE REGISTERED		
71						
ASSIGNEE(S)				DATE REGISTERED		
71						
FULL NAME(S) OF INVENTOR(S)						
72	SYMONS, MICHAEL WINDSOR					
PRIORITY CLAIMED		COUNTRY		NUMBER		
N.B. Use International abbreviation for country (see Schedule 4)		33	NIL	31	NIL	
				32	NIL	
TITLE OF INVENTION						
54	METHOD OF PRODUCING AN INORGANIC BINDER CONTAINING PRODUCT					
ADDRESS OF APPLICANT(S)/PATENTEE(S)						
BUILDING 16, CSIR CAMPUS, MEIRING NAUDE ROAD, SCIENTIA, PRETORIA, GAUTENG, SOUTH AFRICA						
ADDRESS FOR SERVICE				S & F REF		
74	SPOOR & FISHER, SANDTON			PA133592/P		
PATENT OF ADDITION NO.			DATE OF ANY CHANGE			
61						
FRESH APPLICATION BASED ON			DATE OF ANY CHANGE			

SPOOR & FISHER

REPUBLIC OF SOUTH AFRICA  
PATENTS ACT, 1978  
**APPLICATION FOR A PATENT**  
AND ACKNOWLEDGEMENT OF RECEIPT  
(Section 30 (1) – Regulation 22)

REPUBLIC OF SOUTH AFRICA  
REVENUE

R 0060.00

HASR 711

The granting of a patent is hereby requested by the undermentioned applicant on the basis of the present application filed in duplicate

REPUBLIC OF SOUTH AFRICA  
S & F REFERENCE

OFFICIAL APPLICATION NO.

21 01 **2002/5960**

PA133592/P

FULL NAME(S) OF APPLICANT(S)

71 BALMORAL TECHNOLOGIES (PROPRIETARY) LIMITED

ADDRESS(ES) OF APPLICANT(S)

BUILDING 16, CSIR CAMPUS, MEIRING NAUDE ROAD, SCIENTIA, PRETORIA, GAUTENG, SOUTH AFRICA

TITLE OF INVENTION

54 METHOD OF PRODUCING AN INORGANIC BINDER CONTAINING PRODUCT

THE APPLICANT CLAIMS PRIORITY AS SET OUT ON THE ACCOMPANYING FORM P.2. THE EARLIEST PRIORITY CLAIM IS:

COUNTRY: NIL NUMBER: NIL DATE: NIL

THIS APPLICATION IS FOR A PATENT OF ADDITION TO PATENT APPLICATION NO.

21 01

THIS APPLICATION IS A FRESH APPLICATION IN TERMS OF SECTION 37 AND IS BASED ON APPLICATION NO.

21 01

THIS APPLICATION IS ACCOMPANIED BY:

- ☒ 1. A single copy of a provisional specification of 8 pages.
- ☒ 2. Drawings of 1 sheet.
- ☐ 3. Publication particulars and abstract (Form P.8 in duplicate).
- ☐ 4. A copy of Figure of the drawings (if any) for the abstract.
- ☐ 5. Assignment of invention.
- ☐ 6. Certified priority document.
- ☐ 7. Translation of the priority document.
- ☐ 8. Assignment of priority rights.
- ☐ 9. A copy of the Form P.2 and the specification of S.A. Patent Application No.
- ☐ 10. Declaration and power of attorney on Form P.3.
- ☐ 11. Request for ante-dating on Form P.4.
- ☐ 12. Request for classification on Form P.9.
- ☒ 13. Form P.2 in duplicate.
- ☐ 14. Other.

74 ADDRESS FOR SERVICE: SPOOR & FISHER, SANDTON

Dated: 25 July 2002

*AM Dye*  
SPOOR & FISHER  
PATENT ATTORNEYS FOR THE APPLICANT(S)

REGISTRAR OF PATENTS, TRADE MARKS AND COPYRIGHT
15.08.2002 2002-07-25
REGISTRATEUR VAN PATENTE, MODELLE, HANDELSMERKE EN OUTEURSREG
REGISTRAR OF PATENTS

*Post-dated*

REPUBLIC OF SOUTH AFRICA  
PATENTS ACT, 1978

## PROVISIONAL SPECIFICATION

(Section 30(1) – Regulation 27)

OFFICIAL APPLICATION NO.

LODGING DATE

*Post-dated*

21	01	<b>2002/ 5960</b>
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22	<del>25 JULY 2002</del> 15. 08. 2002
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FULL NAMES OF APPLICANTS

71	BALMORAL TECHNOLOGIES (PROPRIETARY) LIMITED
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FULL NAMES OF INVENTORS

72	SYMONS, MICHAEL WINDSOR
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TITLE OF INVENTION

54	METHOD OF PRODUCING AN INORGANIC BINDER CONTAINING PRODUCT
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### **BACKGROUND OF THE INVENTION**

This invention relates to a method of producing a product from a flexible open cell polymeric foam element and an inorganic binder, and to the product so made, and is in addition to, improvement in or modification of the invention described in South African Patent Application No 2002/5395.

The invention described in SA Patent Application No 2002/5395 is a method of producing a product from:

- (a) a flexible open cell polymeric foam element; and
- (b) a hydraulic binder slurry;

which includes the steps of:

- (i) introducing the hydraulic binder slurry into the open cells of the foam element by compressing the foam element to exclude air from the open cells and then releasing the compression with the foam element in contact with the hydraulic binder slurry so that the hydraulic binder slurry penetrates and becomes contained in the open cells of the foam element; and

- (ii) allowing the hydraulic binder to set and dry to form the product.

### **SUMMARY OF THE INVENTION**

It has now been found that inorganic binders other than hydraulic binders may be used in the method of the invention. Thus, the method of the invention as described above includes producing a product from:

- (b) (i) a hydraulic binder slurry; or
- (ii) a mixture of a pozzolan and either lime or Portland cement in the form of a slurry; or
- (iii) a synthetic geopolymer precursor slurry.

When utilizing a synthetic geopolymer precursor slurry, after impregnation thereof into the flexible open cell polymeric foam element and drying, the product is post-impregnated with a suitable compound in solution to form the geopolymer.

In the method of the invention described in South African Patent Application No 2002/5395, the method preferably includes the step, after step (1) and before step (2) of:

compressing the foam element containing the hydraulic binder slurry to remove therefrom a proportion of the hydraulic binder slurry.

It has now been found that this compression step may be carried out for other purposes.

Thus, the method of the invention preferably includes the step, after step (1) and before step (2) of:

compressing the foam element containing the inorganic binder slurry:

- (i) to remove therefrom a proportion of the inorganic binder slurry; and/or

- (ii) to impose a shape upon the foam element containing the inorganic binder slurry; and/or
- (iii) to achieve a higher concentration of the inorganic binder slurry at the surfaces of the foam element when compared with the concentration of the inorganic binder slurry in the interior of the foam element.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

**Figure 1** is a schematic view of a step of the method of the invention;

**Figure 2** is a schematic view of a product of the method of the invention; and

**Figure 3** is a schematic view of a cell of a flexible open cell polymeric foam element used in the method of the invention.

#### **DESCRIPTION OF EMBODIMENTS**

As indicated above, there may be used instead of the hydraulic binder slurry a different type of inorganic binder slurry.

Further, various hydraulic binders, in addition to those disclosed in SA Patent Application No 2002/5395, may also be used. Thus, the hydraulic binder is preferably selected from the group consisting of Portland cement, the alpha and beta hemi-hydrates of calcium sulphate, a calcium aluminate cement, a calcium sulpho aluminate cement, a high alumina cement, magnesium oxychloride and magnesium oxysulphate, and a combination of two or more thereof.

The inorganic binder may also be a combination of a pozzolan and lime or Portland cement in a water slurry.

Suitable pozzolans include silica fume with a particle size in the range of from 5 000 to 20 000 m<sup>2</sup>/kg, ground granulated blast furnace slag with a particle size in the range of from 300 to 2 000 m<sup>2</sup>/kg, and fly ash with a particle size in the range of from 300 to 2 000 m<sup>2</sup>/kg, or a mixture of any two or more thereof.

As stated above, the pozzolan must be combined with either lime or Portland cement. Generally there is used 95 to 75 parts by weight of the pozzolan to 5 to 25 parts by weight of the lime or Portland cement.

The inorganic binder may also be a synthetic geopolymer precursor in water slurry. An example of a suitable geopolymer precursor is a blend of a metal oxide such as aluminium oxide or magnesium oxide with a calcium silicate, in the form of Wollastonite, the blend having a particle size of 300 mesh or finer. In this case, the geopolymer precursor is impregnated into the foam element in the form of a water slurry. Thereafter the foam element containing the slurry is dried and then post-impregnated with a compound selected from the group consisting of ammonium phosphate, phosphoric acid, or a solution of aluminium phosphate and phosphoric acid, to form the geopolymer, viz. a magnesium ammonium phosphate hexahydrate.

Another example of a suitable geopolymer precursor is a dispersion of an aluminous silicate oxide such as Meta kaolin with a colloidal silica sol or alkali polysilicate. Again, after impregnation, the foam element impregnated with the geopolymer precursor is dried and then post-impregnated with a strong alkali such as sodium or potassium hydroxide, to form the geopolymer.

The second feature of the present invention is the inclusion in the method of the invention of a step, after step (1) and before step (2) of:

compressing the foam element containing the inorganic binder slurry:

(i) to remove therefrom a proportion of the inorganic binder slurry; and/or



- (ii) to impose a shape upon the foam element containing the inorganic binder slurry, and/or
- (iii) to achieve a higher concentration of the inorganic binder slurry at the surfaces of the foam element when compared with the concentration of the organic binder slurry in the interior of the foam element.

The first alternative of compressing the foam element containing the inorganic binder slurry to remove therefrom a proportion of the inorganic binder slurry is described in South African Patent Application No 2002/5395.

In terms of the second alternative, the foam element containing the inorganic binder slurry is compressed to impose a shape upon the foam element, either on one or both sides of the foam element, which shape is retained when the inorganic binder sets.

This is illustrated schematically in Figure 1. Referring to Figure 1, a foam element 10 impregnated with an inorganic binder slurry is conveyed from a slurry tank (not shown) on a conveyer 12 and then between top and bottom conveyors 14, 16 respectively, the conveyor 14 being shaped as illustrated, to impose a shape upon the foam element 10. The inorganic binder impregnated in the foam element 10 must set sufficiently prior to release from the conveyors 14, 16 so that the foam element 10 retains its shape once it is moved out from between the conveyors 14, 16.

The shaped foam element 10 is then conveyed on a conveyor 18 into a drier 20, where the product is dried.

As an alternative, when the inorganic binder is for example a Portland cement, the foam element 10 may be shaped between platens 22 which are then stacked and/or clamped to allow the Portland cement to set sufficiently prior to

removal of the foam elements 10 from the platens 22, e.g for a period of 12 to 24 hours.

For example, the foam elements 10 may be allowed to hydrate fully over an extended period by stacking in an open area with or without steam curing.

In the case of other inorganic binders such as for example gypsum the foam elements should be removed from the shaping conveyor or platen within a maximum of twenty minutes, more preferably within about three minutes, to prevent any tendency of the foam element to stick to the conveyor or the platen.

In the third alternative, the foam element containing the inorganic binder slurry is compressed to increase the concentration of the inorganic binder at the surfaces of the foam element relative to the concentration of the inorganic binder in the interior of the foam element.

This is illustrated in Figure 2 where there is shown a foam element 30 having a higher concentration of inorganic binder 32 close to the surfaces thereof relative to the concentration of inorganic binder 34 in the interior of the foam element 30.

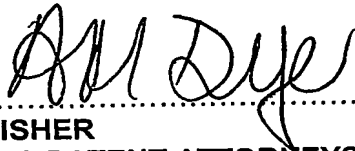
For example the foam element may initially have a thickness of 20 mm which is then compressed to a final thickness of 12 mm.

This is achieved as is illustrated schematically in Figure 3. In Figure 3A, there is shown an open cell 40 of a foam element containing an amount of an inorganic binder 42. In Figure 3B the same cell 40 is illustrated when it has been partly compressed, indicating the concentration of the inorganic binder 42 in the cell. In Figure 3C there is again illustrated the same cell 40, now with an even greater concentration of the inorganic binder 42 in the cell 40.

-7-

In this way, it is possible to produce what is effectively a stress skin component with the highest concentration of the inorganic binder being in the outer horizons of the component.

Dated this 25th day of July 2002



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SPOOR & FISHER  
APPLICANT'S PATENT ATTORNEYS

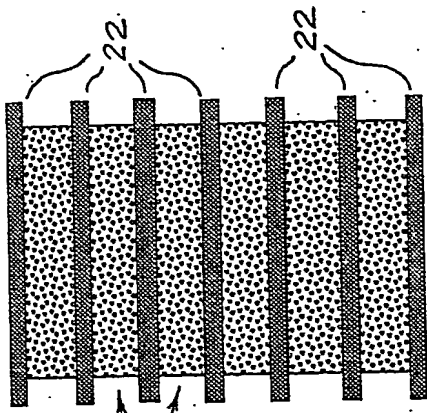


FIG 1

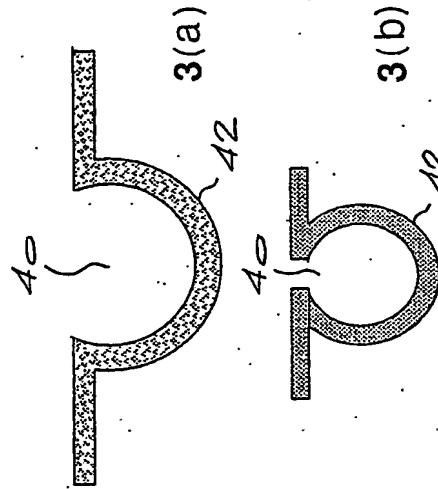
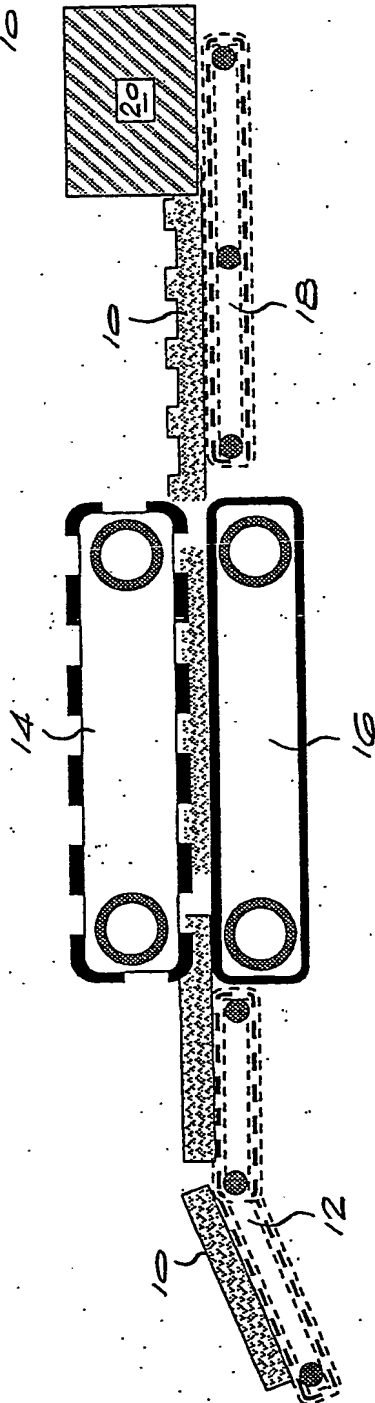


FIG 3

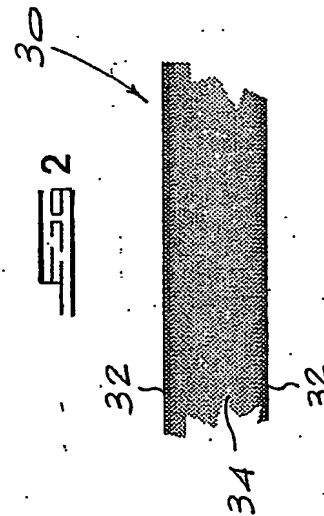


FIG 2

As Dye

# Document made available under the Patent Cooperation Treaty (PCT)

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